Claims

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent is:

1 ~~1. An embedding method for embedding additional~~
2 watermarking information into the data representing text
3 information as a black and white binary document image,
4 having the steps of:
5 detecting text image area; and
6 modifying the features of said text image area.

1 2. A detecting method for detecting additional watermarking
2 information embedded into a document image by the method
3 according to claim 1, having the steps of:
4 detecting text image area; and
5 extracting the features from said text image area.

1 3.The method according to Claim 1 wherein the feature
2 comprises either one or a combination of, the number of
3 black pixels, the transitive number of black and white
4 pixels, occurrence frequency of any specific local
5 pattern and average thickness of a line segment.

1 4.The method according to claim 1 wherein the image area
2 for embedding or detecting said additional watermarking
3 information is a rectangle circumscribed around a text
4 line.

1 5.The method according to claim 1 for embedding
2 additional watermarking information into the data
3 representing text information as an image, having the
4 ~~steps~~ of:

dividing said embedded text image area into two subblocks vertically and two or more subblocks horizontally;
dividing said subblocks into different upper and lower groups; and
modifying the features for respective groups to increase or decrease them to one phase or many phases.

6.The method according to claim 1 for embedding additional watermarking information into the data representing text information as an image, having the steps of:
detecting text image area;
modifying the features of said text image area; and
embedding 1 or more bit of additional watermarking information into two or more lines.

7.A detecting method for detecting additional watermarking information embedded into the document image by the method according to claim 6, having the step of detecting 1 or more bit of embedded additional watermarking information from two or more lines.

8.An embedding method for embedding additional watermarking information into the data representing text information as a black and white binary document image, having the steps of:
detecting text image area;
splitting said embedded text image area into two or more subblocks;
dividing said subblocks into two or more groups; and
modifying the features for respective groups to increase or decrease them to one phase or many phases.

9.A detecting method for detecting additional watermarking information embedded into the document image by the method according to claim 8, having the steps of:
detecting text image area;
splitting said text image area into two or more subblocks;
dividing said subblocks into two or more groups;
integrating the features detected from subblocks in respective groups; and
determining the value of said information by comparing the integrated values of said groups.

10.The method according to claim 8 wherein the feature comprises either one or a combination of, the number of black pixels, the transitive number of black and white pixels, occurrence frequency of any specific local pattern and average thickness of a line segment.

11.The method according to claim 8 wherein the image area for embedding or detecting said additional watermarking information is a rectangle circumscribed around a text line.

12.The embedding method according to claim 8 for embedding additional watermarking information into the data representing text information as an image, having the steps of:
dividing said embedded text image area into two subblocks vertically and two or more subblocks horizontally;
dividing said subblocks into different upper and lower groups; and

modifying the features for respective groups to increase or decrease them to one phase or many phases.

13.The embedding method according to claim 8 for embedding additional watermarking information into the data representing text information as an image, having the steps of:
detecting text image area;
modifying the features of said text image area; and
embedding 1 or more bit of additional watermarking information into two or more lines.

14.A detecting method for detecting additional watermarking information embedded into the document image by the method according to claim 13, having the step of detecting 1 or more bit of embedded additional watermarking information from two or more lines.

15.An embedding device for embedding additional watermarking information into the data representing text information as a black and white binary document image, having the means of:
detecting text image area; and
modifying the features of said text image area.

16.A detecting device for detecting additional watermarking information embedded into a document image, having the means of:
detecting text image area; and
extracting the features from said text image area.

17.An embedding device for embedding additional watermarking information into the data representing text information as a black and white binary document image, having the means of:
detecting text image area;
splitting said embedded text image area into two or more subblocks;
dividing said subblocks into two or more groups; and
modifying the features for respective groups to increase or decrease them to one phase or many phases.

18.A detecting device for detecting additional watermarking information embedded into the document image, having the means of:
detecting text image area;
splitting said text image area into two or more subblocks;
dividing said subblocks into two or more groups;
integrating the features detected from subblocks in said respective groups; and
determining the value of said information by comparing the integrated values of said groups.